CLAIMS

What is claimed is:

1. A method for exploring viewpoint and focal length of camera that has an axis-symmetrical nonlinear-distortive lens, the method comprises:

providing a calibration target with a test pattern composed of at least one geometric figure;

aiming the center of the test pattern at an optic axis of a lens in the camera; and

searching a pinpoint along the optic axis to enable at least one image height on an image plane which is related to the geometric figure and the corresponding zenithal angle between the incident rays of light and the optic axis both fit in with a projection model.

2. The method according to claim 1, wherein the geometric figure is selected from the group comprising a circle, a rectangle, a triangle and a polygon.

3. The method according to claim 1, wherein there is a plurality of the geometric figures composed of concentric circles, concentric rectangles, concentric triangles or concentric polygons.

4. The method according to claim 1, wherein the optic axis is further located by the steps comprise:

placing the calibration target in the field of view of the camera to let the test pattern form a corresponding image on the image plane; and

changing the position of the calibration target to make the image similar to the test pattern, then connecting both the centers of the calibration target and the image to locate the optic axis.

5. The method according to claim 1, wherein the lens in the camera is a fisheye lens.

6. The method according to claim 1, wherein the lens is a nonlinear lens with a given projection model.

7. The method according to claim 1, wherein the projection model is selected from the group comprising an equidistant projection, an orthographic projection and a stereographic projection.

8. The method according to claim 1, wherein the pinpoint is the viewpoint of the lens in the camera.

9. The method according to claim 1, wherein the calibration target has at least one flat plane to provide the test pattern.

10. The method according to claim 8, wherein the periphery of the flat plane further vertically extends a surface to turn the calibration target into a hollow and one- side-open shape.

11. The method according to claim 1, wherein the camera is selected from the group comprising a CCD camera, a CMOS camera, a digital camera and a traditional camera with film.

12. A method for exploring viewpoint and focal length of camera that has an axis-symmetrical nonlinear-distortive lens, the method comprises:

providing a calibration target with a test pattern composed of at least one geometric figure;

placing the calibration target in the field of view of the camera to let the test pattern form a corresponding image on an image plane;

changing the position of the calibration target to make the image similar to the

test pattern, then connecting both the centers of the calibration target and the image to locate an optic axis; and

searching a pinpoint along the optic axis to enable at least one image height on the image plane which is related to the geometric figure and the corresponding zenithal angle between the incident rays of light and the optic axis both fit in with a projection model.

13. The method according to claim 12, wherein the geometric figure is selected from the group comprising a circle, a rectangle, a square, a triangle and a polygon.

14. The method according to claim 12, wherein there is a plurality of the geometric figures composed of concentric circles, concentric rectangles, concentric triangle or concentric polygons.

15. The method according to claim 12, wherein the lens in the camera is a fisheye lens.

16. The method according to claim 12, wherein the lens is a nonlinear lens with a given projection model.

17. The method according to claim 12, wherein the projection model is selected from the group comprising an equidistant projection, an orthographic projection and a stereographic projection.

18. The method according to claim 12, wherein the pinpoint is the viewpoint of the lens in the camera.

19. The method according to claim 12, wherein the calibration target has at least one flat plane to provide the test pattern.

20. The method according to claim 12, wherein the periphery of the flat plane further vertically extends a surrounding surface to turn the calibration target into a hollow and one-

side-open shape.

21. The method according to claim 12, wherein the camera is selected from the group comprising a CCD camera, a CMOS camera, a digital camera and a traditional camera with film.